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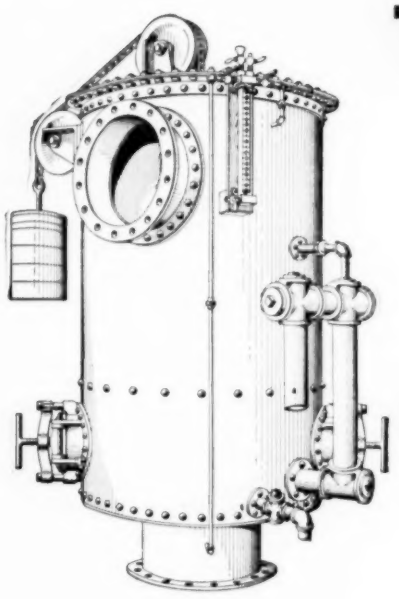

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ADDRESS OF PRESIDENT A C. BLINN BEFORE THE INDIANA GAS ASSOCIATION.

REGULATION BY COMMISSION. PERSONNEL OF BOARDS. VALUATION FOR RATE MAKING. FINANCIAL CONDITIONS.

It would seem proper on an occasion of this kind to confine these remarks to the particular branch of business in which we are engaged, but we constitute one division in the great field occupied by public service corporations, which entitles the speaker to comment in a brief way on the general situation, past and present, relative to corporations operating under public grants.

Prior to the time these and similar properties came under Governmental control in the several States, they were in most cases subject to certain regulatory powers granted to cities by State Legislatures. Speaking generally, these powers, together with "Yellow Journalism," were used by local politicians in a manner that reflected no credit on the administration with which they were identified, and operated against the best interests of the consuming public. Out of those conditions—to which it is hoped we will never return—grew the demand for State boards of control, and one of the chief arguments used for the passage of the utility laws was the claim that thereby public utilities would be removed from the atmosphere of politics. Whether or not the laws passed by the States have succeeded in placing these corporations sefely beyond the designs of politicians is a question open to very serious argument. That the subject should present even the slightest speculation, must be repugnant to the ideas of intelligent right-thinking citizens who give any thought to the public welfare.

One of the most common methods of seeking public favor by politicians has been to attack corporations engaged in public service, and while on the one hand the companies have on many occasions been subject to deserved criticism, in just as many instances have accusations been made that were wholly without foundation and made for the sole purpose of personal political ambition. The public's interests in all matters where Public Service Companies are concerned cannot be enhanced by malicious attacks, and in a great majority of cases, if selfish motives were eliminated, the differences between Municipalities and Public Service Corporations would be subject to settlement by calm and sane consideration of the issues.

Conditions will improve from year to year as the Regulating Boards in the various States acquire knowledge of the business which they control. With perhaps two exceptions, State Commissions frankly admit a lack of information as to the momentous problems involved in administering the laws. It could hardly be expected that any other condition could prevail, inasmuch as men are generally selected for these boards who have never before been in any way connected with a Public Utility. It would be difficult to find a higher type of manhood than is represented by the members of the State Commissions; they are unquestionably men of integrity, possessing rare judgment in the line of work with which they are familiar and with which they have been associated, yet in nearly all cases these gentlemen have had no technical experience, education nor training in the construction, operation or financing of the businesses whose affairs they are called upon to supervise. The work to a certain extent is of an engineering nature, and it would appear that the public as well as the companies would profit by having on these boards some members who have had broad experience in the building and operating of public utility properties. A company under investigation by a State Commission that would show excessive manufacturing costs due to the fact that its gas plant or generating station was under the direct supervision of a physician, would be subject to just condemnation, yet nearly all of the States have Administrative Boards whose members have followed a line of work up to the time of their appointment as far removed from the Public Utility field as a physician's life is from a retort house. The vast amount of capital invested in Public Service properties would seem to justify the fairness of having at least 2 members of each Commission (of 5 or more) who are qualified by practical experience to pass on the important questions arising from time to time in reference to the construction, operation, valuation and maintenance of these properties.

In all of the States where public utility laws are in force a great amount of valuation work has been going on, and as the practice is similar in all of the States of fixing valuations for rate making purposes at the "Cost New" less "Depreciation," it would seem proper to discuss for a moment this very important feature in valuation work. Let us consider the case of a property built before the enactment of public utility laws which prescribe how rates shall be determined. Assume a property constructed new within a period of 2 years and its maintenance kept to a point where it is 100% efficient; after a period of 5 years a valuation is made by a State Commission and the property is found to be in only 85% condition. It is absolutely impossible to keep it in 100% condition—to do this would require constant renewals, it being well understood that certain apparatus after several years' service, may be in perfect operating condition, yet not have the sale value of an absolutely new unit; therefore when the valuation is made the investors find they have put up $100 to get $85. At once the point is raised that they should have set aside a Depreciation Fund, but under the old order of things properties were frequently built in communities where a depreciation charge added to the rates would have stifled the business. I am not refering now to a hypothetical case; this is the situation that has been found to exist in hundreds of places, yet the Supreme Court of the United States has held that the rates can be determined only on the present value of the property, which means that if $100,000 has been invested and the property kept in a condition to render 100% service, and after a few years even under the very highest maintenance it is said to be only in 85% condition, the investors have lost unless they have been able to set aside a Depreciation Fund, and which is never possible in a new property and often impossible after many years' operation.

Some of the most learned students of economies hold the view that the proposition has not been properly presented to the Supreme Court of the United States, and some go so far as to believe that the highest tribunal in the land will at some time reverse itself on this phase of valuation work.

In considering this point we should keep in mind that the stockholders of the companies at all times carry a liability to keep their properties in a condition to render 100% service. Under the present methods of control they are required to keep them in this condition by Public Service Commissions, and it seems a travesty on justice to deny them the right to earn on the reproduction cost.

Public utility laws in all the States are comparitively new, and it would be folly to expect ideal conditions in a short time, but the

situation as effecting these and other companies has undoubtedly been materially bettered by the laws creating Public Service Commissions, and while during the first few years of their existence the work must necessarily pass through a period of development, in the long run the welfare of the corporations and the public which they serve, must improve along with the growth in knowledge and experience of the State officials whose duty it is to supervise our actions.

Public Service Commissions in every State should have the hearty and sincere co-operation of the Utilities Companies, and we should exercise a degree of patience that perhaps would not be called for in any other undertaking. By this it is not intended to convey the thought that we should not face the problems that come up from time to time in an absolutely fearless and courageous spirit.

Last year, while serving as vice-president, I called attention to the uncertain condition of business throughout the country and the propriety of exercising care in expenditures for extensions and improvements. Just at a time when it appeared that the country would get its business affairs back to a sound basis, the European war caused a set back from which it will doubtless require several years to recover; and until there is some marked change in the situation, corporations are thoroughly justified in exercising the most careful scrutiny on requisitions for construction funds.

In closing I want to remind you, as others have done before me, that these corporations are dealing with the public which is at all times extremely critical, but which is also fair. Much can be gained by taking the public into our confidence and I strongly urge the utmost frankness concerning all of our affairs when dealing with public officials. It must not be forgotten that we are public servants, and that a time will never come when we are not conducting a campaign of education as to our exact position in the business world, and we must always exercise a degree of patience, consideration and kindness that is not required in a private enterprise.

Photometry of Incandescent Lamps.

[From the paper by J. W. ROPER, read before the Yorkshire, England, Junior Gas Association.]

On the introduction of high pressure gas supply in Bradford, I had occasion to make tests of various high-pressure lamps, particularly their illuminating values at certain angles, besides tests on low-pressure burners with various globes and shades. As the existing apparatus was an ordinary 60-inch bar photometer in a very small room, it was necessary to make other arrangements, and at as small expense as possible,

The only room available was 16 feet by 6.5 by 12 feet high partitioned off from a store room, the partition being on one of the long sides. Most of the apparatus advertised requires a large room, and are expensive, so various portable photometers and illuminometers were considered; their great advantage being that they can be used for checking the value of the lamps when hung. The final decision fell upon the Holophane "Lumeter."

This consists of a box $5\frac{3}{4}$ inches by $4\frac{1}{2}$ by $1\frac{3}{4}$, inside which is a circular whitened chamber, enclosing a small glow-lamp connected to an accumulator. The light from the lamp passes through an adjustable shutter onto one side of a small white disc through the transparent center of which it can be observed. A matt-white celluloid card is now placed on the spot on which it is required to find the illumination; and by looking through the lumeter at the card, and gradually opening or closing the shutter in front of the glow-lamp, a balance can be obtained between the outer circle of the white disc and the centre—*i.e.*, the card seen through the centre. On a graduated scale connected to the shutter the foot-candle illumination upon the card can be read.

If the candle power of a lamp is required, the card is placed at a known distance from the lamp at right angles to the rays of light; and the foot-candles multiplied by the distance in feet squared gives the candle-power at that particular angle. The range of the instrument can be increased for reading high illumination by inserting between the card and the disc a neutral tinted glass of known density, giving a range of from 0.01 to 2000 foot-candles.

The next point to decide was whether to fix the celluloid card in a central position and revolve the lamp round it to obtain the illumination at the various angles, or to keep the lamp stationary and revolve the card. The second method was finally adopted, chiefly owing to the difficulty of moving heavy lamps.

The walls and ceiling of the room were painted dead-black, and upon the long partition wall a chart was marked out in thin matt-red lines (which show very clearly on the black) the centre line about 5 feet 6 inches above the floor. Fig. 1 shows the semicircle marked at each 10°.

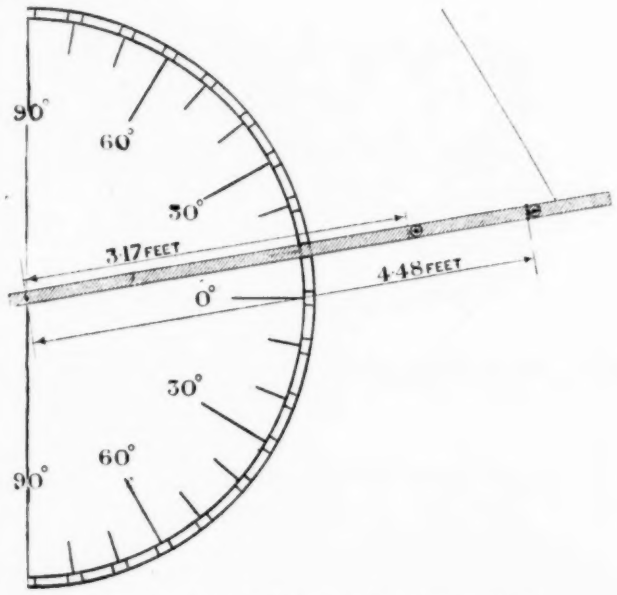

Fig. 1.—Disc-Carrier and Angle-Indicator.

At the centre of the circle a 1-inch hole was drilled in the partition, and into it fixed a brass bushing. 4 inches long, having a $\frac{1}{2}$-inch hole and a flange so that it could be screwed fast to the partition. A steel bar was turned down for about 4 inches to fit nicely into the bushing for a pivot, and a piece of wood, 5 feet 6 inches long by 2 inches wide by 1 inch thick, swinging easily on the spindle. From the centre of the spindle, distances of 3.17 feet and 4.48 feet, were then measured along the bar, these being the square root of 10 and 20 feet respectively. At an additional distance of 1 inch small tapped flanges were fixed to carry the rod that holds the disc, a piece of $\frac{1}{4}$-inch round steel, 24 inches long, threaded on one end which could be screwed into either of the flanges on the bar. A piece of blackened tin, about 4 inches square, was then fixed to a piece of copper tube which would slip on the steel rod, and a small set-screw allowed it to be fixed in any position. The lumeter disc can be strapped to this carrier by two rubber bands. See the plan Fig. 2.

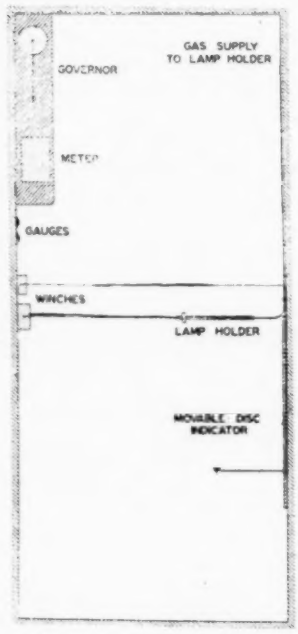

Fig. 2.—Plan of Room.

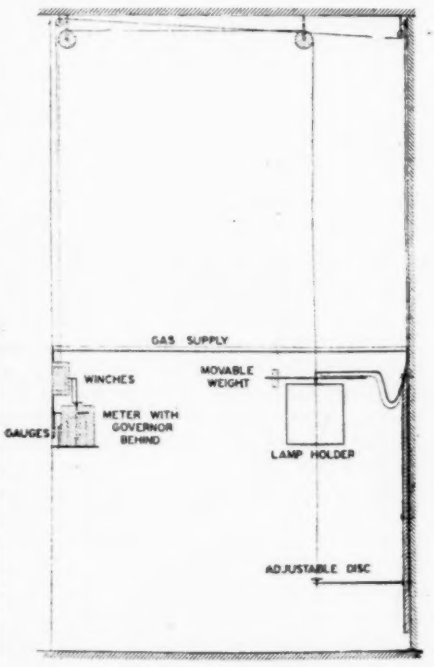

Fig. 3.—Elevation.

A small hook is screwed into the top of the bar near the end, and a cord passed up to the roof, over a pulley, across the ceiling and down to a winch on the opposite wall (shown in Fig. 3). This completes the disc carrier, which can be set at any angle desired. The bar is 2 inches wide, and just fits between the lines drawn on

each side of the angle mark, thus facilitating setting of the bar exactly to the angle.

The lamp carrier was the next point to be decided. If a fixture was made, the lamp could not easily be got at for adjustment; the difference in the lengths of the various lamps was a difficulty, the centre of the mantle having to be exactly opposite the centre of the movable bar for each test. An arrangement was devised by which the lamp and carrier were suspended by a wire rope at a point 22 inches from the wall, where it passes over a pulley (see Fig. 3).

The disc-carrier is set exactly the same distance from the wall by means of the set-screw. On the end of the wire rope is suspended horizontally, a piece of flat iron 2 feet long by 1 inch wide by ¼-inch thick, through the centre of which a ½-inch hole is drilled, and a ½-inch nipple (2 inches long) inserted and fastened with a locknut on each side. On the top of the bar is connected a ½-inch elbow, and a tee ½ by ¼ and to one ½-inch connection a 10-inch length of ½-inch pipe with a length of ½-inch flexible tube from the gas supply. To the small outlet of the tee is connected a ¼-inch elbow and piece of pipe, a length of ¼-inch flexible tube to a pipe which runs round the room to a couple of gauges—one water to 6 inches pressure, the other mercury to 100 inches of water pressure (see Figs. 2 and 4). By this means the pressure is obtained as near as possible to the burner-head, and gives practically the pressure at the nipple. A sliding weight at the other end of the bar counterbalances the two flexible tubes.

Any inverted lamp or burner can now be connected to the under side of the bar by reducing fittings. For upright burner testing, a frame of ¼-inch copper tube about 18 inches square is used with a ball-joint at the top and a vertical gas-feed at the centre of the bottom tube (see Fig. 3).

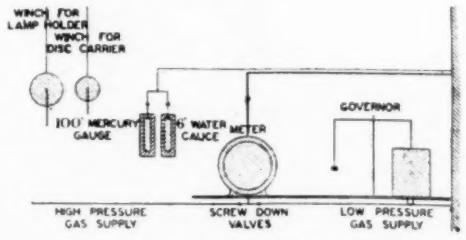

Fig. 4.—Side Elevation.

On opposide side of the room to the disc-carrier are the 2 winches, 2 gauges and the gas supplies (Fig. 4). High pressure gas feeds from the left and low pressure from the right. The low pressure gas passes through a governor and regulator cock to the meter, the high-pressure gas direct to the meter. From the meter outlet the gas travels round the room to the flexible connection. The return pipe to pressure guages follows the feed pipe. The meter used is a wet test meter, the front and back plates of the case having been strengthened to work up to 100 inches of water pressure.

The winches, gauges and meter are placed so that they can be read with the operator's back to the light under test, for if one looks toward a powerful light it is impossible to judge the illumination of the disc for several minutes. A movable wood stand carrying a frame covered with a piece of black velvet, is used for protecting the eyes from any side light when making readings.

Method of Making a Test.—The carrier is lowered and the lamp or burner is screwed to the ½-inch nipple under the iron bar, the joints made tight by graphite compound. The lamp is now raised to a height at which the air and gas adjusters can be reached, the lamp lighted and adjusted temporarily. After allowing it to burn for at least half-an-hour the lamp is again adjusted and set to the required pressure, then hoisted to the correct position for testing—*i. e.*, with the centre of the mantle opposite the pivot of the movable arm. This is easily obtained by using a light wood set-square having one long side about 2 feet long and one short side about 1 foot. By placing the short side to the wall, the top level with the pivot, the long side will stretch right across the mantle, and the centre can be judged.

While the lamp is getting hot, the lumeter is checked by fixing the disc at a known distance from a 10-candle power standard burner and making several readings. This is necessary owing to the accumulator varying, but any variation can be corrected by adjusting the position of the lamp in the instrument.

The white disc is now fitted to the carrier and placed in position to receive the horizontal rays from the lamp; the disc being vertical. The movable screen is next placed between the lamp and the operator, and the lamp is left for a short period to enable the operator's eyes to rest.

When ready to take readings, the pressure is noted, the consumption of gas by the lamp taken at the meter, and a reading at horizontal taken with the lumeter. The disc is then dropped to 10 degrées, which can be done without looking at the light, and another reading taken. This is continued to 90 degrees. After a few minutes' rest the readings are again taken—this time working upwards from the bottom. The pressure and consumption are again noted, and if a large number of readings have been taken, the lumeter is again checked by the 10-candle standard to make sure no alteration has occurred. From the results obtained, polar curves can readily be plotted and the angle of maximum light from the lamp easily obtained.

Pacific Gas and Electric Company Valuation Methods.

Speaking before the Worcester (Mass.) Polytechnic Institute branch of the American Institute of Electrical Engineers, Mr. George H. Throop, of the J. G. White Engineering Corporation, described the appraisal of the Pacific Gas and Electric Company of California. In anticipation of the public utilities act of 1912, the company engaged the White organization to value its property in order to give it data to justify its rates in any hearing before the new commission, to facilitate additional financing, and to check the assessed values of property for taxation. At the time of appraisal the outstanding securities totalled about $100,000,000. Operations covered thirty counties, representing an area of 37,950 square miles, including 212 municipalities with a total population of over 1,100,000. Electrical energy was furnished in 205 of these places, gas in 55, water in 19 and street railway service in 1, and water was supplied for several irrigation systems. The company operated 1,320 miles of high-tension line, mostly at 60,000 volts, and 1,850 miles of gas mains, 124 miles of high-pressure gas pipe, and in the six larger cities over 410 miles of underground cable. In the electrical distribution systems there were 71,500 poles, or over 1,500 miles of pole line, and 638 miles of pole line between towns and in country districts, supplying power for irrigation pumping, etc. The street railway in Sacramento operated about 35 miles of track.

The valuation was started in April, 1911, and about a month was spent in preparing forms, obtaining data and maps and getting an organization together. The field inventory was begun in the last week of May and completed early in the following September. The work of arranging and tabulating the field inventory data and of determining material and labor unit costs was carried on contemporaneously with the field work. After the latter was completed the organization finished the computation of quantities, applied unit costs and tabulated results. The valuation was completed in July, 1912.

Every building was measured and complete bills of materials drawn off. Sketches of each were made in the field on quadrilateral ruled paper to scales of from 10 feet to 20 feet per inch. A light jointed bamboo rod was used for vertical measurements, and other measurements were made with tape and rule. The sketches gave plan, elevation and cross-section and showed the construction in considerable detail, but only main dimensions were given. After the sketches were completed one man would measure and call off the material and a second man would list it, with the sketches before him, noting the length. The men became adapt, and the time required to make sketches did not exceed that required to check up blueprints and to make corrections due to changes in plans.

In the inventory of the gas mains use was made of the company's records, which were checked against each other. All mains and services were plotted on large scale maps and were checked with work orders as far as possible; and then the gas consumers, as determined from meter readers's books, were plotted on the maps to make them complete.

Unit labor costs were worked up from construction records: material costs from records and quotations from manufacturers. Transcontinental and local freight rates were tabulated for all commodities and the cost of hauling. Present prices of material and labor were adopted, except for copper and cast-iron pipe, where the average for the five previous years was used. To the cost of material and labor overhead charges to cover administration, interest and taxes during construction, engineering and supervision, contingencies, liability insurance, loss and breakage of tools and omissions and errors in inventory were added. The overhead charges were applied to each item, and ranged from 15 to 28% depending upon the class of material or construction.

THE COST AND PRICE OF GAS IN A SMALL CITY.

[From the paper read by WM. C. BUTTERWORTH, before the Wisconsin Gas Association.]

In our efforts to determine a safe and just price at which gas should be sold in a small city or rural district, it is necessary to make a careful study of all the items entering into operating expenses of the plant and to consider the revenue to make investment in such a plant safe and sound.

It is not unusual, when a franchise is granted, for the promotor and cities fathers to fix a maximum flat gas rate for all consumers, and feel that they have advanced the welfare of the community. But when that maximum rate is fixed by comparison with rates in other cities having a much larger gas send-out, they have made it next to impossible for the gas company in a city of less than 10,000 population to adequately serve its patrons and prosper financially. The gas company cannot charge the small consumers and those who have a meter for convenience for more than a very small part of the cost of service rendered to them, and is forced to get it out of the large consumer, if he can be found.

In our consideration of the items of operating expenses, we can group all items necessary to maintain the plant and render good service (ready to deliver gas at the outlet of the consumer's meter without the gas) and term the same "community benefit." From this community benefit and the number of meters in service we can determine the cost "ready-to-serve per meter"; something which bears no relation to the quantity of gas consumed.

We can group all the items of expense bearing a proportion to the amount of gas delivered by themselves, and from this group and the total gas accounted for, we can determine the cost of gas per 1,000, for the gas only. Then the cost "ready-to-serve per meter," plus the cost of the quantity of gas passed by each meter, equals the cost of service in so far as operating expenses enter into it.

To Protect the Depreciation Reserve.—About 56% of the value of the plant, such as buildings, distribution system, etc., is a "community value," and 2% on it should be added to the ready-to-serve cost. The other 44% of the value of the plant, holder, plant equipment, etc., is a "capacity value," and 3% on it should be added to the cost of the gas.

If the small city gas manager will tabulate all his meter readings from no consumption to the largest consumption, and his cost, in the above manner, he will find that a flat rate is not fairly applicable. And he will find the just minimum bill, and proper group of consumers for each reduction as the consumption increases; and will thus build a set of cost rates that will be just to the consumer and make the plant profitable, and contribute to satisfied consumers and increase the gas accounted for.

The following is the unit cost per meter per month and per 1,000 cubic feet of gas accounted for, taken from the operating expenses of the Platteville gas plant and based on 460 meters with 845,600 cubic feet of gas accounted for per month:

Unit Cost.

	Per Meter Per Month.	Per 1,000 Cu. Ft. Gas.
Production—Steam:		
Labor	.0797	....
Fuel	.0293	....
Water	.0118	....
Misscellaneous supplies	.0026	....
	.1234	
Maintenance equipment	.0123	....
Total steam	.1357	....
Coal Gas Operation:		
Labor	.2409	
Coal Carbonized less coke and tar	....	.1687
Bench fuel	....	.1534
Gas (light)	.0414	....
Gas (test)	....	.0068
Water	....	.0064
Miscellaneous supplies	....	.0098
	.2823	.3451
Total operation	.4180	.3451
Maintenance:		
Apparatus	.0034	....
Building, Fixtures, Grounds	.0031	....
	.0065	....
Total production	.4245	.3451
Distribution:		
Operation—Labor	....	....
Customers' premises	.1888	....
Supplies, expenses	....	....
Total operation	.1888	....
Maintenance; street mains	.0295	....
Services	.0011	....
Meters	.0739	....
Total maintenance	.1045	....
Total distribution	.2933	....
Commercial:		
Collection expenses	.0637	....
Promotion, new business	....	.0190
Total commercial	.0637	.0190
General Operation:		
Salaries	.3904	....
Supplies and expenses	....	.0168
Gas (light and demonstration)	.0237	....
Office heat	.0153	....
Miscellaneous general expense	.0117	....
Total operation	.4411	....
Maintenance, office equipment	.0050	....
Office rent	.0435	....
Total maintenance	.0485	....
Total general	.4896	.0168
Undistributed:		
Injuries and damages	....	...
Insurance	.0337	....
Stationary and printing	....	.0113
Utility equipment:		
Operation	....	....
Maintenance	....	.0068
Stores	....	.0487
Total undistributed	.0337	.0688
Cost per meter per month	1.3048	....
Cost per M cu. ft. gas accounted for,	....	.4497
Depreciation	.1318	.1257
Totals	1.4366	.5754

Some items are in the meter column which on first glance might appear to properly belong to the gas column, but they are placed as they are because ten million cubic feet of gas per year is very close to the minimum capacity for which a coal gas plant can be equipped and manned; and below this capacity these items cease to be a gas cost and become a meter cost.

On March 31st, 1913 the Platteville Gas Company adopted a $1.70 rate. If bill is paid on or before the 10th of the following month a refund of 10 cents on the first 2,000 cubic feet, 20 cents on the next 3,000, 30 cents on the next 5,000, and 40 cents on all over 10,000, is allowed. The minimum bill for a 10-light meter is 50 cents per month, and for larger meters $1 per month.

With this scale of prices and the above unit costs the following tables are made:

Comparison of Cost of Service (per Meter per Month, and per Thousand Cubic Feet Gas as Consumption Increases) with Gas Revenues (Amount per Meter and Total Each Consumption.)

Cubic Feet Gas Consumed			Cost of Service			Gas Revenues		Balance	
Amount Consumed.	No. Meters.	Total for Class.	Per Meter.	Per M. Cu. Ft	Total Cost.	Net per Meter.	Total Amount.	Amount.	Per M. Cu. Ft.
.0	1	.0	$1.4366	$.....	$1.44	$1.00	$1.00	$ .44	$.....
.0	25	.0	1.4366	.....	35.91	.50	12.50	23.41	.....
.1	8	.8	1.4941	.....	11.95	.50	4.00	7.95	.....
.2	16	3.2	1.5517	.....	24.83	.50	8.00	16.83	.....
.3	8	2.4	1.6092	.....	12.87	.50	4.00	8.87	.....
Minimum Group	58	6.4	1.50	13.5937	87.00	.5086	29.50	—57.50	—8.9844
.4	10	4.0	1.6668	.....	16.67	.64	6.40	10.27	.....
.5	11	5.5	1.7243	.....	18.97	.80	8.80	10.17	.....
1st 500 Group	79	15.9	1.5524	7.7132	122.64	.5658	44.70	—77.94	—4.9019
.6	16	9.6	1.7818	.....	28.51	.96	15.36	13.15	.....
.7	15	10.5	1.8394	.....	27.59	1.12	16.80	10.79	.....
.8	20	16.0	1.8969	.....	37.94	1.28	25.60	12.34	.....
.9	16	14.4	1.9545	.....	31.27	1.44	23.04	8.23	.....
1.0	18	18.0	2.0120	.....	36.22	1.60	28.80	7.42	.....
2d 500 Group	85	68.5	1.9004	2.3581	161.53	1.2894	109.60	—51.93	—.7581
1st 1000 Group	164	84.4	1.7327	3.3669	284.17	.9409	154.30	—129.87	—.7925
1.1	16	17.6	2.0695	.....	33.11	1.76	28.16	4.95	.....
1.2	17	20.4	2.1271	.....	36.16	1.92	32.64	3.67	.....
1.3	15	19.5	2.1846	.....	32.77	2.08	31.20	1.57	.....
1.4	15	21.0	2.2422	.....	33.63	2.24	33.60	.03	.....
1.5	12	18.0	2.2997	.....	27.60	2.40	28.80	1.20	.....
3d 500 Group	75	96.5	2.1769	1.6919	163.27	2.0587	154.40	—8.87	—.0919
1st 1500 Group	239	180.9	1.8721	2.4734	447.44	1.2916	308.70	—138.74	—.7669
1.6	16	25.6	2.3572	.....	37.72	2.56	49.96	3.24	.....
1.7	14	23.8	2.4148	.....	33.81	2.72	38.08	4.27	.....
1.8	13	23.4	2.4723	.....	32.14	2.88	37.44	5.30	.....
1.9	14	26.6	2.5299	.....	35.42	3.04	42.56	7.14	.....
2.0	15	30.0	2.5874	.....	38.81	3.20	48.00	9.19	.....
4th 500 Group	72	129.4	2.4708	1.3748	177.90	2.8756	207.04	29.14	.2252
2d 1000 Group	147	225.9	2.3209	1.5103	341.17	2.4588	361.44	20.27	.0807
1st 2000 Group	311	310.3	2.0101	2.0153	625.34	1.6583	515.74	—109.60	—.3532
2.1	11	23.1	2.6449	.....	29.09	3.35	36.85	7.76	.....
2.2	11	24.2	2.7025	.....	29.73	3.50	38.50	8.77	.....
2.3	9	20.7	2.7600	.....	24.84	3.65	32.85	8.01	.....
2.4	11	26.4	2.8176	.....	30.99	3.80	41.80	10.81	.....
2.5	10	25.0	2.8751	.....	28.75	3.95	39.50	10.75	.....
5th 500 Group	52	119.4	2.7577	1.2010	143.40	3.6442	189.50	46.10	.3961
1st 2500 Group	363	429.7	2.1178	1.7890	768.74	1.9428	705.24	—63.50	—.1478
2.6	9	23.4	2.9326	.....	26.39	4.10	36.90	10.51	.....
2.7	6	16.2	2.9992	.....	17.94	5.25	24.50	7.56	.....
2.8	5	14.0	3.0477	.....	15.24	4.40	22.00	6.76	.....
2.9	5	14.5	3.1058	.....	15.53	9.55	22.75	7.22	.....
3.0	3	9.0	3.1628	.....	9.49	4.70	14.10	4.61	.....
6th 500 Group	28	77.1	3.0211	1.0971	84.59	4.3301	121.25	36.66	.4755
3d 1,000 Group	80	196.5	2.8486	1.1603	227.99	3.8844	310.75	82.76	.4212
1st 3,000 Group	391	506.8	2.1569	1.6838	853.33	2.1138	826.49	—26.84	—.0530
3.1	6	18.6	3.2203	.....	19.32	4.85	29.10	9.78	.....
3.2	5	16.0	3.2779	.....	16.39	5.00	25.00	8.61	.....
3.3	3	9.9	3.3354	.....	10.01	5.15	15.45	5.44	.....
3.4	2	6.8	3.3930	.....	6.79	5.30	10.60	3.81	.....
3.5	4	14.0	3.4505	.....	13.80	5.45	21.80	8.00	.....
7th 500 Group	20	65.3	3.3175	1.0155	66.31	5.0175	101.95	35.64	.5456
1st 3,500 Group	411	572.1	2.2376	1.6075	919.64	2.2580	928.44	8.80	.0154
3.6	4	14.4	3.5080	.....	14.03	5.60	22.40	8.37	.....

Cubic Feet Gas Consumed: Amount Consumed.	No. Meters.	Total Class.	Cost of Service: Per Meter	Per M. Cu. Ft.	Total Cost	Gas Revenues: Net per Meter	Total Amount.	Balance: Amount	Per M. Cu. Ft.
3.7	2	7.4	3.5656	.....	7.13	5.75	11.50	4.37	.....
3.8	2	7.6	3.6231	.....	7.25	5.90	11.80	4.55	.....
3.9	4	15.6	3.6807	.....	14.72	6.05	24.20	9.48	.....
4.0	1	4.0	3.7382	.....	3.74	6.20	6.20	2.46	.....
8th 500 Group	13	49.0	3.6054	.9565	46.87	5.8461	76.10	29.23	.5974
4th 1,000 Group	33	114.3	3.4297	.9893	113.18	5.3955	178.05	64.87	.5675
2d 2,000 Group	113	310.8	3.0192	1.0977	341.17	4.3257	488.80	147.63	.4731
1st 4,000 Group	424	621.1	2.2795	1.5561	966.51	2.3692	1004.54	38.03	.0612
4.1	1	4.1	3.7957	.....	3.80	6.35	6.35	2.55	.....
4.2	1	4.2	3.8533	.....	3.85	6.50	6.50	2.65	.....
4.3	1	4.3	3.9108	.....	3.91	6.65	6.65	2.74	.....
4.4	4	17.6	3.9784	.....	15.86	27.20	27.20	11.33	.....
4.5	1	4.5	4.0259	.....	4.03	6.95	6.95	2.92	.....
9th 500 Group	8	34.7	3.9325	.9066	31.46	6.7063	53.65	22.19	.6395
1st 4,500 Group	432	655.8	2,3101	1.5218	997.97	2.4502	1058.19	60.22	.9183
4.6	2	9.2	4.0834	.....	8.17	7.00	14.20	6.03	.....,
4.7	1	4.7	4.1410	.....,	4.14	7.25	7.25	3.11	.....
4.8	1	4.8	4.1985	.....	4.20	7.40	7.40	3.20	.....
4.9	1	4.9	4.2561	.....	4.26	7.55	7.55	3.29	.....,
5.0	1	5.0	4.3136	.....	4.31	7.70	7.70	3.39	.....
10th 500 Group	6	28.6	4.1800	.8769	25.08	7.35	44.10	19.02	.6650
5th 1,000 Group	14	63.3	4.0386	.8932	56.54	6.9821	97.75	41.21	.6513
2d 2,500 Group	75	254.7	3.3908	.9985	254.31	5.2940	397.05	142.74	.5604
1st 5,000 Group	438	684.4	2.3357	1.4948	1023,05	1.4802	1102.29	79.24	.1148
5.1	1	5.1	4.3711	.....	4.37	7.84	7.84	3.47	.....
5.2	1	5.2	4.4287	.....	4.43	7.08	7.98	3.55	.....
5.3	1	5.3	4.4862	.....	4.49	8.12	8.12	3.63	.....
5.4	1	5.4	4.5438	.....	4.54	8.26	8.26	3.72	.....
5.5	1	5.5	4.6013	.....	4.60	8.40	8.40	3.80	.....
5.6	1	5.6	4.6588	.....	4.66	8.54	8.54	3.88	.....
5.7	1	5.7	4.7169	.....	4.72	8.68	5.68	3.96	.....
5.8	1	5.8	4.7739	.....	4.77	8.52	8.82	4.05	.....
5.9	1	5.9	4.8315	.....	4.83	8.96	8.96	4.13	.....
6.0	1	6.0	4.8890	.....	4.89	9.10	9.10	4.21	.....
6th 1000 Group	10	55.5	4.6300	.8342	46.30	8.4700	84.70	38.40	.6921
3d 2000 Group	24	118.8	4.2850	.8657	102.84	7.6021	182.41	79.61	.6720
2d 3000 Group	57	233.1	3.7898	.9267	216.02	6.3246	360.50	144.48	.6198
1st 6000 Group	448	739-9	2.3868	1.4452	1069.35	2.6493	1186.99	117.64	.1590
6.1	1	6.1	4.9465	.....	4.95	9.24	9.24	4.29	.....
6.2	1	6.2	5.0041	.....	5.00	9.38	9.38	4.38	.....
6.4	1	6.4	5.1192	.....	5.12	9.66	9.66	4.54	.....
6.6	1	6.6	5.2342	.....	5.23	9.94	9.94	4.71	.....
6.8	1	6.8	5.3493	.....	5.35	10.22	10.22	4.87	.....
7th 1000 Group	5	32.1	5.1300	.7991	25.65	9.6880	48.44	22.79	.7100
1st 7000 Group	453	772.0	2.4172	1.4184	1095.00	2.7272	1235.43	140.43	.1890
7.4	1	7.4	5.6946	.....	5.69	11.06	11.06	5.37	.....
7.7	1	7.7	5.8672	.....	5.87	11.48	11.48	5.61	.....
8.0	1	8.0	6.0398	.....	6.04	11.90	11.90	5.86	.....
8th 1000 Group	3	23.1	5.8607	.7610	17.60	11.4800	34.44	16.84	.7290
4th 2000 Group	8	55.2	5.4063	.7835	43.25	10.3600	82.88	39.63	.7179
2d 4000 Group	32	174.0	4.5653	.8396	146.09	8.2916	265.33	119.24	.6853
1st 8000 Group	456	795.1	2.4399	1.3993	1112.60	2.7848	1269.87	157.27	.1978
9.7	1	9.7	7.0180	.....	7.02	14.28	14.28	7.26	.....
10.0	1	10.0	7.1906	.....	7.19	14.70	14.70	7.51	.....
5th 2000 Group	2	19.7	7.1050	.7213	14.21	14.49	28.98	14.77	.7497
2d 5000 Group	20	130.4	5.1880	.7957	103.76	9.8280	196.56	92.80	.7117
1st 10,000 Group	458	814.8	2.4603	1.3829	1126.81	2.8359	1298.85	172.04	.2111
14.8	1	14.8	9.9525	.....	9.95	20.94	20.94	10.99	.....
16.0	1	16.0	10.6430	.....	10.64	22.50	22.50	11.86	.....
Over 10,000 Group	2	30.8	10.2950	.6685	20.59	21.72	43.44	22.85	.7419
Total,	460	845.6	2.4943	1.3569	1147.40	1.5874	1342.29	194.89	.2305

Comparison of Cost of Service for Stated Gas Consumed and as Consumption Increases; with Gas Revenue as Contributed to Each Group by all Consumed.

Group.	Cubic Feet Gas Consumed—No. Meters.	Total Gas.	Cost of Servic—Av'ge Meter.	Per M.	Total Cost.	Gas Revenues—Rates.	Am't.	Balance—Am't.	Per M.
Minimum	58	6.4	1.5000	.....	87.00	Minimum	29.50	—57.50	.....
Contributed	402	200.4	.8122	.....	326.50	1.60	320.00	—6.50	.....
1st .5	460	206.4	.8989	2.0034	413.50	1.6934*	349.50	—64.00	—.3100
2d .5	381	174.0	.6613	1.4480	251.95	1.60	278.40	26.45	.1520
1st 1.0	460	380.4	1.4466	1.7493	665.45	1.6506*	627.90	—37.55	—.0937
3d .5	296	132.0	.5526	1.2391	163.56	1.60	211.20	47.64	.3609
1st 1.5	460	512.4	1.8022	1.6179	829.01	1.6376	839.10	10.09	.0197
4th .5	221	95.9	.4848	1.1171	107.13	1.60	153.44	46.31	.4829
2d 1.0	296	227.9	.9111	1.1878	270.69	1.60	364.64	93.95	.4122
1st 2.0	460	608.3	2.0351	1.5389	936.14	1.6316*	992.54	56.40	.0927
3d 1.0	149	105.5	.7042	.9946	104.93	1.50	158.25	53.32	.5054
4th 1.0	69	51.3	.6530	.8784	45.06	1.50	76.95	31.89	.6216
5th 1.0	36	29.3	.6647	.8167	23.93	1.50	43.95	20.02	.6833
3d to 5th inclusive	149	186.1	1.1672	.9346	173.92	1.50	279.15	105.23	.5654
6th 1.0	22	17.5	.6209	.7806	13.66	1.40	24.50	10.84	.6194
7th 1.0	12	9.1	.5617	.7407	6.74	1.40	12.74	6.00	.6593
8th 1.0	7	6.1	.6243	.7164	4.37	1.40	8.54	4.17	.6836
9th 1.0	4	4.0	.6950	.6950	2.78	1.40	5.60	2.82	.7050
10th 1.0	4	3.7	.6400	.6400	2.56	1.40	5.18	2.62	.7081
6th to 10th inclusive	22	40.4	1.3687	.7458	30.11	1.40	56.56	26.45	.6547
11th 1.0	2	2.0	.6700	.6688	1.34	1.30	2.60	1.26	.6312
12th 1.0	2	2.0	.6700	.6688	1.34	1.30	2.60	1.26	.6312
13th 1.0	2	2.0	.6700	.6688	1.34	1.30	2.60	1.26	.6312
14th 1.0	2	2.0	.6700	.6688	1.34	1.30	2.60	1.26	.6312
15th 1.0	2	1.8	.6000	.6667	1.20	1.30	2.34	1.14	.6333
16th 1.0	1	1.0	.6700	.6652	.67	1.30	1.30	.63	.6348
Over 10.0	2	10.8	3.6150	.6694	7.23	1.30	14.04	6.81	.6306
Total	460	845.6	2.4943	1.3569	1147.40	1.5874*	1342.29	194.89	.2305

* Average.

These tables indicate that the Platteville Gas Company is on the right train going in the right direction but running on the wrong time table. I believe that $1 is none too large a charge for the minimum rate. The net rates should be $1.70 for the first 1,000 and 10c less for each 1,000 cubic feet up to 5,000; $1.20 for the next 2,000; $1.10 for the next 3,000; and $1 for all over 10,000 cubic feet.

Applying this rate we have:

Comparison of Cost of Service with Present and Proposed Rates.—And Revenues as Contributed by Each 1,000 Cubic Feet.

Each Thousand.	No. Meters.	Total Cu. Ft.	Cost—Amount.	Per M.	Proposed Revennes—Rate	Amount.	Each Bill—Proposed.	Present.
Minimum	79	15.9	122.64		1.00	79.00	1.00	.50
1st	381	364.5	538.92		1.70	619.65	1.70	1.60
	460	380.4	661.56	1.7391		698.65		
2d	296	227.9	274.56	1.2047	1.60	364.64	3.30	3.20
3d	149	105.5	104.94	.9950	1.50	158.25	4.80	4.70
4th	69	51.3	45.07	.8786	1.40	71.82	6.20	6.20
5th	36	29.3	23.93	.8167	1.30	38.09	7.50	7.70
6th	22	17.5	13.66	.7806	1.20	21.00	8.70	9.10
7th	12	9.1	6.74	.7407	1.20	10.92	9.90	10.50
8th	7	6.1	4.38	.7107	1.10	6.71	11.10	11.90
9th	0	0.0	.00	.7058	1.10	.00	12.20	13.30
10th	4	7.7	5.34	.6935	1.10	8.47	13-30	14.70
11th	2	2.0	1.34	.6688	1.00	2.00	14.30	16.00
12th	2	2.0	1.34	.6688	1.00	2.00	15.30	17.30
13th	2	2.0	1.34	.6688	1.00	2.00	16.30	18.60
14th	2	2.0	1.34	.6688	1.00	2.00	17.30	19.90
15th	1	1.8	1.20	.6666	1.00	1.80	18.30	21.20
16th	1	1.0	.66	.6652	1.00	1.00	19.30	22.50
Totals		845.6	1147.40	1.3569		1389.35		

When the gas accounted for exceeds 12,000,000 cubic feet per year, the above rates should be reduced 10 cents per 1,000 on each group less than 10,000 cubic feet.

Every small gas plant must have a gain above all cost of service to the community, sufficient to provide taxes, interest funds, extraordinary expenses and for dividends on investment; which varies from 35 cents to $1 per 1,000 cubic feet according to local conditions.

I contend that it is practically impossible for a gas utility to be financially successful in a city of less than 10,000 population on a flat rate; but that it can succeed if regarded with community pride and the rates made as near as possible so that each member of that community pays for all the services rendered to him.

This can be done by a sliding scale of rates which puts the price of gas within reach of the members of the community who would use a larger gas service.

Peroxidized Kerosene as Motor Fuel.

Kerosene and other heavy petroleum oils can be utilized as fuel for internal combustion engines if small quantities of peroxides or other highly oxygenated substances, such as picric acid or nitronaphthalenes, etc., are dissolved in them, or sprayed into the air inlet of the carburetter. Thus petroleum with 3% of hydrogen peroxide is stated to be perfectly stable, to differ from the original oil but little in either color, specific gravity or flash-point, and to burn perfectly clean and without residue in the cylinder or odor in the exhaust. The power of the engine is, moreover, increased. Although aqueous peroxide may be used as a spray, it is preferable to shake the aqueous peroxide with the oil, and allow to separate. The hydrocarbon layer will then contain most of the hydrogen peroxide, and is decanted off. Many nitrated substances have also been employed in amounts varying from 0.5 to 5% in solution in the oil with similar results.

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CHARLES H. WADELTON, Secretary and Manager.

SANFORD K. CAMPBELL, Editor.

NEW YORK, MONDAY, MARCH 22, 1915.

Analyse Your Business.

The paper by Mr. Butterworth, which we print in this issue of the JOURNAL, is an example of what a Manager of a gas company can learn of his operation by analysing his costs and receipts. In all the discussions of equitable gas rates this is the most illuminating study we have seen, and we recommend a similar study of conditions to every small company manager. Such expositions should help to the authorized restoring of something like the miscalled meter rent, a step toward a readiness-to-serve charge against the unprofitable consumer.

Illuminating Engineering Society.

At the March Council Meeting I. E. S., held at the general offices, 29 West 39th street, New York, these present were: A. S. McAllister, president; H. Calvert, Ward Harrison, S. G. Hibben, George A. Hoadley, C. A. Littlefield, general secretary; L. B. Marks, treasurer; Preston S. Millar, Alten S. Miller, J. Arnold Norcross and G. H. Stickney.

The 1915 Convention will be held in Washington, D. G., probably during the fourth week of September. Mr. E. S. Marlow, Manager of the Commercial Department of the Potomac Electric Company, Washington, D. C., was appointed chairman of the Convention Committee.

Other committee appointments were as follows: Mr. Douglass Burnett to the National Membership Committee; Mr. Clarence L. Law, chairman of the Committee on Remodeling the Lighting of the General Offices of the Society.

Reports on section activities were received from the following vice-presidents: Mr. Ward Harrison, for Pittsburgh; Prof. G. A. Hoadley, for Philadelphia; Mr. G. H. Stickney, for New York, and Mr. F. A. Vaughn, for Chicago.

In reporting for the Pittsburgh section, Mr. S. G. Hibben stated that the section had instituted a campaign to popularize good lighting through public education. In conjunction with the Committee on School Lighting, a meeting was arranged recently in the Addison School in Cleveland, Ohio, which was attended by teachers and school authorities; the subject of the meeting "Safeguarding the Eyesight of School Children." Copies of this lecture with numerous slides are now available, without cost, to those who desire to prepare for present lectures on the subject. Inquiries regarding this or other popular lectures should be addressed to the Illuminating Engineering Society, 29 West 39th street, New York, N. Y.

A membership statement for the first six months of the present fiscal year showed a net increase of 66 individual and 5 sustaining members, making the present total 1,538 individual and 40 sustaining members.

Progress reports were received from the following committees: Sustaining Membership, Popular Lectures, School Lighting, Exhibition Booth (Gas), Exhibition Booth (Electric), Membership, Constitutional Revision, Lighting Legislation.

The following companies were elected sustaining members: Edison Lamp Works of General Electric Company, Harrison, N. J.: Schenectady Illuminating Company, Schenectaby, N. Y.

Twenty-seven active members were elected.

Standard Gas Range and Fixture Specifications.

The National Commercial Gas Association has issued in pamphlet form the "Standard Gas Range Specification" and the "Standard Gas Fixture Specification," adopted by the Association and endorsed by a committee of the American Gas Institute. Copies of the specifications have been sent to all company members of the N. C. G. A. The gas companies are asked, in selecting gas ranges and gas fixtures, to be guided by the specifications and to insist upon the makers of appliances following their requirements. The manufacturers are asked to advise the Association whether their products conform to the specifications.

These pamphlets represent several years work of competant committes, and the adoption of their recommendations by the gas industry at large will materially aid in improving the quality of gas appliances.

No Company Too Small for a Safety Organization.

The Utilities Mutual Insurance Company bulletin gives an account of a safety organization consisting of but four men that has proved of great value to the company.

Where this organization is in effect there are but four employees, and the methods used here will accomplish considerable good for a utility plant of any size.

When the organization was formed, its first object was to provide an opportunity to discuss with those in authority the general problems connected with the work, and to be a nucleus for a safety organization. As should be, the meetings are held regularly and on each Monday night at 5 P.M. The employees consist of a superintendent, watchman, day engineer and night engineer, the last reporting on Mondays one hour earlier than usual. The superintendent acts as chairman of the meetings and secretary of the organization.

A regular order of business is followed and minutes kept of the prodeedings.

The matters to be discussed are brought up in the following order:

1. Interruptions to service.
2. Suggestions of methods to prevent repetition of them.
3. Progress of new and repair work.
4. Dangerous conditions where accidents might occur.
5. Examination and inspection of the plant. It is arranged that each of the men in turn make a general inspection at least once a month, including tools, ladders, safety appliances and other tools used in connection with the work.

At the meetings attention is called to particular articles appearing in the trade journals that may be of interest or would in any way assist in the operation of the plant.

In the plant is a bulletin board on which are posted general information and literature from the National Safety Council. The company furnishes the trade journals, which are kept on file at the plant for ready reference, and text books on operating and engineering that will assist the employees in their work.

A commendable feature is the use of a modern first-aid outfit; each employee being familiar with methods of resuscitation and care of the injured.

This plant, while small and necessarily employing few men, has the "Safety First" movement well in hand. The advantages are two-fold:—First, it enables the management to operate the plant in an efficient manner; and second, it fits the employees, on account of the knowledge obtained, to better their positions in case of vacancies in larger fields of operation.

[Special Telegraphic Report.]

ELEVENTH ANNUAL CONVENTION, ILLINOIS GAS ASSOCIATION.

CHICAGO, ILLS., March 17, 1915.

The weather this morning was sunny and spring like, and the attendance was over a hundred when President L. H. Johnson opened the session at 10:30.

First on the program was the Report of the Board of Directors, which was conservative in tone, but of interest. It showed the financial condition of the association good, and 415 members on the rolls. The mark for the coming year is set at 500, and Secretary Clark had the pleasure of casting a vote electing nearly enough new members to make up that total.

The Secretary then read some letters and telegrams, among them regrets at not being able to be present at the meeting, from President Jones of the American Gas Institute and from President McLean of the National Commercial Gas Association. Secretary Dunbar of the Indiana Gas Association wrote asking that the Illinois Association adopt the idea proposed at the Indiana meeting of appointing a Committee on "Gas Rates"; the suggestion was favorably received and will be considered to-morrow when "new business" is reached. Vice-President Harper now took the Chair and the President read the Annual Address. He favors the recommendations of the Committee looking to affiliation with the Institute and the N. C. G. A., and that matter will be considered at a session to-night. He advises that all gas men talk and think "prosperity"; recommends the establishment of gas engineering courses at the Universities; and spoke flatteringly of the personnel of the State Public Utilities Commission.

Messrs. Pratt, Copley and Channon were named as the Committee on President's Address: and Goodnow, Luther and Negley to prepare resolutions on deceased members.

Col. Pratt read the report of the Joint Committee on International Gas Congress, including a description, by President E. C. Jones, of the 10,000 square feet of gas exhibits in 61 booths; and of the wonderful effects of the gas lighting in the Exposition grounds. Secretary Ramsdell of the committee spoke of the special train arrangements contemplated, and of the large attendance of gas men indicated by inquiries from America and abroad.

Mr. H. L. Rice then read the report of the Committee on Public Relations, showing that their work for the past year had been principally with the State Utilities Commission in framing rules for standards of service. They believe the rules finally adopted are fair and reasonable.

The first formal paper considered was that on "Inclined Retorts," by R. B. Richardson, which, though short, was well discussed. Carroll Miller asked if there was anything peculiar about the coal used that results were so high; and thought the quenching system interesting. G. F. Goodnow was interested in two similar installations and quite approved the author's conclusions; thought labor low and bench fuel high, and asked about the coal used: A. S. B. Little, Gas Engineer to the Commission, told of successful installations of inclines that he helped to build in England some years ago, and gave some interesting experiences. He thinks inclined retorts ideal for moderate size plants. J. W. Dunbar warned against claims of very high B. T. U. results as being harmful to the industry at large. The author then closed the discussion.

Mr. Turner's paper treating of "Relation Between Shop and Commercial Department" was not discussed at any length, and following it the session adjourned.

This afternoon's session was opened at 2:30 with the address by Dr. W. E. Post on "Medical Work of the Peoples Gas Light and Coke Company," who interestingly described methods of protecting the company and its employees, and the assigning of men to positions according to their physical qualifications. Col. Pratt and Pa i Doty asked some questions and discussed the doctor's methods.

Mr. Walton Forstall, Vice-President of the Institute, was called upon for some remarks, and spoke forcefully of the Gas Congress, urging the necessity of gas men attending its sessions, and calling attention to the prominence given gas lighting at the Exposition and the advertising value of this opportunity to show its many advantages.

The next paper was that on "Use of Lead Wool as a Jointing Material," by C. E. Reinicker. In the discussion Mr. Forstall spoke of their use of cement; but that they now used lead wool for all mains over 16 inches, and found 1½ inches in the joint about right. E. H. Negley asked as to its use for small mains, and was told that cost was prohibitive. J. S. Unger asked as to lead poisoning, but as the men wear gloves there is no danger from this.

The last paper of the day was by O. E. Norman, on "Fundamental Factors Involved in Establishing Service, Charge and Rates of Return of Public Utilities," which, while very important, was not discussed, as the topic is one better treated in Committee than in open meeting. The session then adjourned until to-morrow.

CHICAGO, ILL., March 18, 1915.

This morning's session, opening at 10:30, showed by the attendance that the general interest allowed nothing to interfere with the business of the meeting. The remaining routine business was at once taken up. First, the election of another batch of 20 new members. The matter of a Rate Committee, recommended in a letter from the Indiana Association, will be handled by a sub-committee of the Public Relations Committee to report at next year's meeting.

Mr. F. A. Vaughn, of the Illuminating Engineering Society, spoke of his experience in installing electric and gas street lamps in Milwaukee; and to show the undeveloped possibilities of gas, mentioned gas and electric units so much alike that they could scarcely be told apart. His remarks were interesting and encouraging to gas men.

Mr. Goodnow reported for the Committee on Deceased Members, presenting suitable resolutions on Mr. G. H. Armstrong, Mr. J. E J. Mayer and Mr. W. E. Bersch, all passed away since last meeting.

Mr. H. L. Rice reported for Committee on Affiliation, telling of the advantages offiered by a union with the Institute. This matter will be submitted to the Association for action later.

Col. Pratt reported for Committee on President's Address, commending it warmly.

The election of officers resulted as follows: President, R. B. Harper, Chicago; Vice-President, C. W. Bradley, Chicago; Secreretary-Treasurer, H. H. Clark, Chicago; Directors, F. J. Baker, Chicago, and Elmer W. Smith, Kewanee. All the new officers were introduced and made brief responses. By-the-way, the new Vice-President is a son of our "Chief" Bradley.

The paper by S. A. Reinhard and C. A. Schnerr, on the "Use of Exhaust Steam and its Possible Economics in a Small Water Gas Plant," was read and discussed, but most of this was too technical to report briefly.

The afternoon session was given over to the reading and discussion of the two remaining papers: "The Immediate Gas Engine Business," by H. W. Edmund; and "Experience with a By-Product Coke Oven Plant as a Gas Generator," by C. C. Boardman. The discussions were interesting as they brought out a wide variety of experiences.

When adjournment was reached it was with the intention of meeting next at San Francisco in September.

The banquet to-night will be largely attended. Colonel Pratt as toastmaster could hardly be improved upon, and Hon. W. J. Calhoun and Mr. John Gribbal for the principal speakers assure good speeches. An elaborate vaudeville entertainment is also on the program.—W. A. D.

APPLICATION OF BY-PRODUCT COKE OVENS TO THE GAS INDUSTRY.

[Paper read before the Indiana Gas Association, by J. D. FORREST.]

The widely advertised success of the Citizens Gas Company of Indianapolis in furnishing gas at the unprecedentedly low rate of 60 cents per 1,000 cubic feet (more recently reduced to 55 cents) has drawn a great deal of attention to the by-product coke oven as an economical device for the production of gas. A great many managers of gas properties have given consideration to it, and a great multitude of people who have been attacking the gas companies have thought they have found in the by-product coke oven a solution for all of the problems connected with the price of gas. Since I was personally responsible for the adoption of by-product coke ovens by the company which I represent, it has been assumed that I stand for that process of gas manufacture against every other for all classes and conditions of gas companies. When I was asked to read a paper before this Association, it occurred to me that it was my duty to the gas industry in general to present not only the advantages of by-product coke ovens for certain communities, but also the reasons why they are entirely unsuitable for a larger number of communities. It is not my purpose to deal with the technical side of the by-product coke oven or to lay before you any long array of statistics. Rather, I desire to give to you my views on the broad proposition covered by the subject of this paper.

For places for which the by-product coke oven is adapted, there can be no question that it is at present the most ecconomical process of gas manufacture known. While the process does not differ greatly in principle from that of the ordinary coal gas retort, the scale on which the operation of the plant is conducted gives it such advantages over the retort system that the difference becomes a radical one. The advantages may be enumerated briefly.

In the first place there is great economy in carbonizing in bulk. Instead of using a chamber containing a few hundred pounds of coal, the coke oven may receive a great many tons, the largest and most modern ones running up well above 15 tons. The labor of charging these ovens and of discharging and handling the coke is practically the same regardless of the size of the charge. While the mechanical equipment must be vastly more expensive than that required for coal gas retorts, and the cost of maintenance must consequently be greatly increased, the direct labor of operation is reduced almost to a vanishing point as compared with the labor required for carbonizing the same tonnage of coal in ordinary retorts. Another important advantage is, that the quality of coke is much superior to that produced by retorts. It is true that this is due to a certain extent to the selection of better coking coals, the gas yields being to some extent neglected; but even with the same coals that are used in good by-product coke oven practice the retort could not produce as good coke. The by-product coke oven admits of a better regulation of the heats, and the mass of the coal, together with the strength of the oven construction, permits the use of a slightly swelling coal mixture which will result in a much denser and stronger coke than the retort can produce. This superiority of the coke means a better and also a wider market for it. It is a better domestic fuel and ordinarily commands a better price than gas house coke. But it is also so well adapted to foundry and blast furnace purposes that it usually commands a premium over the best grades of Connellsville beehive coke. By-product coke is rapidly displacing beehive coke, and is doing so by commanding a higher price instead of a lower one. By this ability to provide coke for a wider range of uses, the by-product coke oven must command a better market than the coal gas retort. Not only is the local price certain to be better, but the value of the product and its adaptability to numerous uses enables it to stand transportation charges to very distant markets. This is an important desideratum, for the gas demand of almost any city must necessitate the production of coke, if the by-product process is used, in excess of the coke demands for the same community. The Citizens Gas Company of Indianapolis could not exist if it were not able to market a large proportion of its output of coke at points hundreds of miles away from its ovens.

Granting a good market for a large volume of coke, the by-product coke oven is more economical than the retort from the point of view of fuel consumption. Coke is worth more to the domestic consumer, the foundry, or to the blast furnace than it is to the retort. I mean by this that gas produced in the carbonization of coal is a cheaper fuel in the operation of the retort or coke oven than coke produced from the carbonization of coal. While every by-product plant has certain inferior grades of coke which may be used for its own fuel purposes, it may be taken as a general principle that it is more economical for the by-product coke oven to sell its coke and use part of its gas for heating the ovens, than to sell all of the gas and use part of the coke for heating. The quantity of gas produced by the modern coke oven is rather greater than the retort can produce from the same mixture of coal, but it is in the use of gas for heating the ovens that one of the great economies is found. At our Langsdale Avenue plant a compromise method of heating is provided which has certain advantages under certain conditions; namely, the heating of the ovens to a very large extent with producer-gas generated from cheaper grades of coal. This, however, is designed rather for the sake of recovering the maximum amount of gas from a given number of ovens than because of economy as compared with the use of oven gas for the same purpose. Therefore it represents an arrangement for avoiding an enlargement of the coke oven plant. and consequently the extension of the coke market, rather than economy of operation. With a larger capital investment and confidence in a wider market for coke, it would be more economical to enlarge the coke oven operation than to heat the ovens with producer gas. I may add that half of the ovens at our Prospect Street plant were constructed with a view to a possible future application of producer gas for heating purposes, but this also was done only because of our recognition of the limitations of Indianapolis as a coke marketing center.

When provision is made for separating the gases, whereby the leaner gas may be used for heating the ovens while the richer gas is sent to the consumer, the by-product coke oven produces a much richer gas for distribution than the coal gas retort. That is, a given standard of quality may be maintained without enrichment of the gas, and consequently economy of operation is found on this side also. At our Prospect Street Plant, where the gases are separated, we are easily able, except in times of unusual emergency, to produce gas having a heat value considerably in excess of 600 B. t. u. The average for the year 1914 at this plant was 630 B. t. u. At our Langsdale Avenue Plant, however, where the gases are not separated, it is very difficult to keep the average heat value up to 600 B. t. u., and there are many occasions when it drops considerably below that figure. Nevertheless the gas produced at the Langsdale Avenue plant from a coal mixture averaging 29% of volatile matter averaged 599.27 B. t. u. for the year 1914; and I venture to say that this is a considerably better record than any coal gas retort could make with the same coal. While it cannot be claimed that by-product coke oven operations usually recover much more tar and ammonia than well managed coal gas plants, they certainly recover larger percentages of those by-products than the coal gas retorts could recover from the coal which the by-product coke oven uses.

Summarizing the advantages of the by-product coke oven, we find that the labor cost per ton of coal carbonized is lower; the quantity, quality and value of coke produced is higher; the fuel requirements for carbonization are more economical; the quantity and quality of gas are better, and the quantity and quality of by-products likewise are better than the best practice of coal gas retorts can obtain. These are certainly advantages which indicate the adaptibility of the by-product coke oven to the manufacture of gas for city distribution; wherever conditions are favorable for the operation of such plants.

However, this qualifying clause that I have used has so much significance to my mind, that I must devote the remainder of my paper to showing the reasons why by-product coke ovens are not well adapted to the purpose of gas manufacture for the great majority of gas companies.

The objection to the by-product coke oven which occurs first to the gas operator is the difficulty in disposing of the coke. When it was decided to erect by-product coke ovens in Indianapolis, the enterprise was derided and every possible reason was given why the Citizens Gas Company was doomed to failure. The reason most frequently given was that it was impossible to sell the coke. It was urged that the quantity of coke produced to supply even the modest business which the company first endeavored to take care of could never be marketed, and consequently that the company would soon be ruined. The fact that the Citizens Gas Company now controls and operates the plant and system of the men who criticized the

coke-oven project most severely, is the best proof that our judgment was correct when we decided to install by-product coke ovens. Nevertheless, the force of this chief objection to the by-product coke oven must be recognized, and I desire to point out that the objection is even greater than appears on the surface. On the one hand, there are many small communities, or even cities as large as Indianapolis, which cannot possibly employ by-product coke ovens successfully because there is no market available for the coke, while on the other hand there are many large cities where the gas requirements are so vast that the production of sufficient coke to supply the gas consumers from by-product coke ovens would mean a volume of coke which in the present state of demand could not possibly be sold. The by-product coke plant will obtain a much larger revenue from its coke and by-products than it does from gas. Some idea of the relation of the two sources of income may be obtained from the following comparisons: In the year 1914 the gross operating revenue of the Citizens Gas Company of Indianapolis was $2,548,346.82, of which $1,143,390.12 came from the sale of gas, and $1,404,956.71 from the sale of coke and by-products. During the same year the Consolidated Gas Company of New York had a gross income from its gas department of $25,500,000, of which $23,200,000 came from the sale of gas and $2,300,000 from the sale of coke and by-products. No reference is made in either case to non-operating income and no reference is made to the electrical business of the Consolidated Gas Company. With a total gas income over twenty times as great as that of the Citizens Gas Company, the Consolidated Gas Company derived an income from the sale of coke and by-products less than one and two-thirds times as great as the income of the Citizens Gas Company from that sourse. Although the coke consumption in territory tributary to Greater New York is enormous, the Consolidated Gas Company could not possibly have produced all of the gas to meet the requirements of New York from by-product coke ovens, because it could not have sold the coke. It is only when a market for the coke can be sesured that the gas company can venture to look to the by-product coke oven for its process of manufacture, and it must be admitted that in the vast majority of cities in this country this difficulty alone is sufficient to prevent the introduction of by-product coke ovens. This is only one aspect of the problem regarding coke and by-products. I shall recur to this subject again after mentioning other important reasons which must prevent the average gas company from installing by-product coke ovens.

One such reason is the investment required for the plant. In many communities it would be impossible to have gas at all if it could not be produced by water gas plants, and this altogether apart from the question of sale of coke. There are many communities that could not stand the capital charges required for installing coal gas plants. Manifestly, then, it would be impossible to consider by-product coke ovens for such places. Now the cost of installation of a by-product coke oven plant over a coal gas retort plant of the same gas capacity, is greater than the cost of a coal gas retort plant over a water gas plant of the same gas capacity. Everything about a by-product coke plant must be built on a large scale. It is not only necessary to make the individual chamber that is to receive the coal large and expensive, but it is necessary to have a considerable number of these chambers in order to obtain economical results, for a large battery of ovens can be operated with the same number of men that would be required for three or four ovens. Therefore it would not be profitable to install by-product coke ovens unless a considerable tonnage of coke could be produced every day. I am inclined to think that the initial construction of the Citizens Gas Company in this city was as small as it would be possible to operate with any particular economy, and that construction provided for a carbonizing capacity of nearly 500 tons of coal per day. Not only must the ovens themselves represent a heavy investment, but all of the machinery connected with the ovens, the condensing house and by-product recovery equipment and the yard facilities of such a plant must be large and costly. It is quite evident not many gas companies can afford to install such equipment to meet the demands of the communities which they are serving. In order to operate such a plant at all, it must have a considerable volume of gas business, as well as a market for its coke and by-products. While conditions may differ in different places, I am inclined to the view that a by-product coke oven plant is not well adapted to any community which requires less than a million cubic feet of gas per day.

In connection with the capital investment required by a by-product coke oven plant, we must bear in mind the fact that most communities have gas plants representing a considerable investment and operated as going concerns for the benefit of their consumers. While I make no defense of any concern that would allow its equipment to get out of date, and would not take the position that a community must go on forever paying interest charges on an expensive plant which might be superseded by a more efficient one, we must recognize that the by-product coke oven process is comparatively recent and that the problems connected with its application to given communities are exceedingly complex; and, therefore, the condition of the art of gas manufacture has not yet reached the point where a community can justly demand that a modern and well equipped gas retort plant or water gas plant should be "scrapped" in order to admit of the construction of by-product coke ovens. Even where a situation renders the installation of a by-product coke ovens advisable, the existence of a perfectly good plant that was constructed in good faith by men who took all reasonable account of conditions at the time, must very often preclude consideration of by-product coke ovens. If a by-product coke oven plant could be tacked on to an existing gas plant with comparatively little additional expense, it might often be considered; but in view of the immense investment required for a proper plant of that character, and in view of the existence of a good plant of another type built in good faith and with the exercise of reasonable care, the community has to be satisfied with what it has already obtained, at least for a reasonable period. Otherwise in all fairness the company must be allowed to earn a reasonable return, not only on the by-product coke ovens but on the plant discarded long before its usefulness was ended. Under these circumstances the increased interest charges would probably more than counterbalance the economies from the by-product coke oven operation.

There is a further important consideration growing out of the large volume of coke and by-products to be handled, which is sufficient to cause a decision against by-product coke ovens in a very large nnmber of cases. A public utility is usually conceived to be organized to provide some definite public service. The problem of serving the public is itself so complicated that those who are engaged in discharging that duty seldom care to undertake large additional responsibilities that amount to the same as the management of other enterprises not essentially connected with the public utility proper. The ideal method of providing gas for a community is by a water gas plant, which can furnish gas and at the same time throws upon the management no duty not immediately connected with the public service, except that of disposing of an inconsiderable by-product in the form of water gas tar. It is recognized that there are many places where a coal gas plant can properly be installed for operation in conjunction with a water gas plant, primarily on the ground that the water gas plant will consume the greater part of the coke. A considerable step beyond the operation of a public utility proper is taken when a coal gas retort is the sole source of sunply of gas, for there is then thrown upon the management the burden of a very considerable industry outside of the public service proper. However, if the coke produced can be absorbed by the community served by the gas company, the task is simple because the company can use its organization to a considerable extent in selling the coke. Now when the final step is taken of installing by-product coke ovens as a source of gas supply, an entirely new industry is brought in large enough and complex enough to demand the entire attention of the management, without having it connected in any way with the duty of meeting the peculiar conditions surrounding the supply of a public utility. A by-product coke oven plant is a large manufacturing concern. As I have already pointed out, the Citizens Gas Company, of Indianapolis derived more than 50% of its gross revenue in the year 1914 from business other than the sale of gas. I must remind you that the company produced during the year 1914 over 250,000,000 cubic feet of water gas, chiefly during the first three months of the year when the Landsdale Avenue coke ovens were either not in commission or were operated to a limited extent because they were just being completed and put to use A normal year for the Citizins Gas Company would mean a still larger proportion of its gross income from the sale of commodities other than gas. The problem of meeting market conditions for these products is itself a large one.

In addition to the sales' end of the coke and by-products business, the problem of coal supply becomes one of a magnitude never realized by any gas operator as such. It is no longer a question of getting certain tonnage of coal with a certain average volatile matter, such as the manager of a gas plant must meet, but it is a problem of buying a coal which first of all will produce good coke of the kind for which a market is in sight. Secondarily this coal must produce gas and by-products, but the enterprise will be a failure unless the quality of coke can be maintained at a high standard. Now the coals available for gas making are much more

numerous and more easily located than those available for high grade metallurgical coke. The coals purchased by a by-product coking company must be selected with a good deal of care from a somewhat limited area, and must be bought at prices which can be afforded in view of the coke market. Here are large questions which the manager of a gas plant never meets at all. Aside from the question of the purchase of coal and the marketing of coke and by-products over a wide area, the problems of manufacture likewise add very greatly to the responsibilities of the management. A failure to maintain the proper heat conditions in a coal gas retort may result in a smaller yield of gas or by-products, but a failure of the same nature in the operation of a by-product coke oven may mean the same relative loss in gas and by-products, and in addition the production of an immense amount of coke which cannot be sold at all. I do not want to magnify the difficulties of by-product coke oven operation, but I am very positive in my view that they are such as the manager of a gas plant is practically never required to meet. In other words, a by-product coke oven plant is a large manufacturing concern, the operation of which bears very little resemblance to that of a gas plant proper, and the product of which is subject to the vicissitudes of general business which touch the gas industry only to a limited extent.

Now, it may be a question whether it is right to throw upon the management of a public utility these diverse duties. The public is exacting and uninformed; the business of the distribution of gas is subject to a great many peculiar difficulties requiring close attention; the problems of meeting the needs of the public and of extending the business are peculiarly harassing. It may be doubted whether the organization of a gas company can very often be made adequate to take care of all of these duties of the public utility company and at the same time manage a great manufacturing concern. Certainly this cannot very well be accomplished by a company whose organization must be small because of the size of the community; and even if the city is large there may very often be conditions which would render it unwise to bring the management of these two diverse enterprises within one organization. By this statement I am not confessing that the Citizens Gas Company made a mistake in adopting the by-product coke oven process of gas manufacture. If I had the whole history to live over, I should still consider it the only method by which the company could have been made a success. We have no regrets because of our choice. However, I will say that the responsibilities which I voluntarily but perhaps rashly assumed are such that a prudent man should not take upon himself without mature deliberation. While I do not regret the choice which our company made or the labor involved in accomplishing our purpose, I can say that once in a lifetime is often enough for a man to undertake such harassing responsibilities; and, so far as I might be personally involved in the unundertaking, Indianapolis would not have 60-cent gas if the job had to be done over again.

This does not mean that the by-product coke oven should not be used extensively for the supply of gas for city distribution. I simply mean that the gas company should buy gas from the by-product coke oven plant, rather than to undertake to operate the by-product coke oven plant itself. This is not a new conclusion on my part, for I saw all the implications of the union of the two industries at the time the Citizens Gas Company decided to install coke ovens. The conditions of organization and finance made it impracticable to separate the two interests in our case. It was a wise thing to combine them because it was only by that means that the result could have been accomplished. Except for these special conditions which seldom apply in other cases, it would be far better to let the manufacturing industry take care of itself and the public utility take care of itself, with no relation between the two except a contractual one, which should be mutually advantageous. I believe there are many points where by-product coke ovens can be established advantageously and where the gas produced by them can be used for city distribution, but I do not believe that the community or the gas company is often justified in assuming the risk and responsibilities of the by-product coking business, nor do I believe that the by-product coking enterprise is justified in bringing itself under the limitations and special difficulties of the public utility. The ideal arrangement is one under which the by-product coke ovens can sell all of their surplus gas to the gas company, but where the consumption of gas is in excess of that supplied by the by-product ovens. Under these conditions a gas company would operate its own water gas plant and secure great economies by purchasing a large proportion, but not its total requirements, of gas from the by-product coking company. The latter company would then be under no rigid regulations with reference to calorific value of the gas, while a gas company through the operation of its water gas plant could keep the gas up to the standard established by law or by its own practice. The management of the gas company could devote itself entirely to the problems belonging to a public utility, while the management of the by-product coking company could devote itself to the large manufacturing and selling problems which must always confront that industry. Peculiar conditions in Indianapolis rendered the complete amalgamation of the two industries a necessity. Voluntary assumption of the risks and responsibilities of operating a coking plant, as, for instance, in the case of the Laclede Gas Company of St. Louis, I believe to be unwise

Following to their logical conclusion the ideas I have just expressed about the diverse character of the two industries under consideration, I call your attention to another problem which has probably not yet arisen with any gas company, but which is bound to be a serious one where by-product coke ovens are used. I refer to the attitude of public service commissions or other public authorities toward the question of rate making. The law which seeks to regulate the rates of public utilities is based on the assumption that the business provided by a community is relatively stable and that the risks of the business are reduced to a minimum. Under these circumstances it is possible for a conscientious and intelligent regulating body to establish rates which will yield a reasonable return on the investment in the public utility. The element of risk is taken into account to some extent and the rate of return on the investment is justly recognized to be different under different conditions. Nevertheless, the determination of a reasonable rate of return on the investment in a by-product coking industry involves so many problems in no way connected with the ordinary questions before public utility commissions that it may be doubted whether such commissions are likely to be in a position to give the subject proper consideration. It is not hard to determine what is a reasonable allowance for the fluctuations in the cost of manufacturing gas in an ordinary plant or for the variations in the expense of distributing the same; but here is a large manufacturing industry whose income on its investment in the manufacturing plant proper is derived to the extent of perhaps 75% from a business in no manner connected with gas. For purposes of rate making it is necessary to take into account a reasonable cost of gas in the holder and add to that the cost of distribution, sale and management; and then make proper allowance for interest on the investment in this somewhat stable industry. What public service commission would care to take upon itself the determination of the proper marketing of the large output of a by-product coke oven plant, and what one is likely to be in a position to measure the hazards of business for such a plant? I do not say that it cannot be done, and I do not say that a wise and just commission would not allow a return on the investment in such an enterprise far in excess of what it would deem reasonable for the gas business proper; but it is very evident that the problems before a commission which sought to pass on such a question would be entirely dissimilar to any confronting a commission which was deciding the mere question of gas rates. On the other hand, if a gas company were purchasing its gas from an independent by-product coking company, the commission would be called upon to decide only whether the price paid for the gas under the contract was a reasonable one as compared with the cost of gas to the company by any of the well recognized processes of gas manufacture. If it could be shown that the gas company was buying gas at less than it would cost to make it by either the water gas, coal gas or mixed process, the commission could scarcely deem the contract an unreasonable one. But when the by-product coke plant is an integral part of the gas company's equipment and its finances are not separated from those connected with the distributing system, it becomes a more difficult thing to determine what should be allowed as the proper cost for gas in the holder, on which the rates are to be based. It is clear that up to the point of putting gas in the holder, the return on the investment should be much higher than the return allowed by rate-making bodies on the investment in ordinary gas plants, but how much higher or by what method the manufacturing process is to be related to the rest of the business in the judgment of the regulating body, is a question which has never yet been remotely considered by any of our public service commissions. In my judgment the by-product coking industry should be kept distinct from the gas business in all questions involving the public regulation of rates; and in view of the uncertainties regarding the rate of return which would be deemed reasonable by the regulating body, I do not believe that it would often be possible to interest the investor in a by-product coke oven as a part of the equipment of a public utility. Again, local considerations made the undertaking by the Citizens Gas Company justifiable. The company was financed locally by people who either

subscribed small sums on account of public spirit or were influenced by confidence in the promoters of the company. The success of the company has been sufficient to enable it to finance its enlargements and extensions. But in a great many cases where the capital that is called to the service of the public utility is wavering between investment in its securities and investment in other securities in some other place, it may be questioned whether many gas companies could successfully finance by-product coke ovens so long as there remain so many and intricate unsettled questions connected with the public regulation of rates. In a number of instances where I have been consulted by persons interested in obtaining the advantages of by-product coke oven gas for gas companies, I have invariably advised a complete separation of the two industries. I believe that it is to the mutual advantage of both that the connection should be contractual rather than proprietary.

My general conclusion, therefore, is that at the present time the most economical known method of gas manufacture is the by-product coke oven, and that it is so economical that it should be employed wherever conditions justify it. But on the other hand it is not only impossible to give it a universal application to the needs of gas companies, but also it is generally unwise to have the gas company itself own and operate by-product coke ovens even where the location is well adapted to the establishment of a by-product coking plant.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,127,950. Heat Radiating Attachment for Gas and Oil Illuminating Burners. J. Weigel, Sr., Cincinnati, O.

1,127,872. Burner Attachment for Gas Jets. O. W. R. Elfreich, New York city.

1,128,445. Gas Cock. T. J. Henning, San Diego, Cal.

1,128,549. Process of Making Gas. G. M. S. Tait, Montclair, N. J., assignor to Hydrocarbon Converter Co., New York city.

1,128,584. Combined Furnace and Gas Generator Therefor. J. A. Charter, Chicago, Ills.

1,128,644. Lighter for Gas Stoves. T. L. Wiese, Milwaukee, Wis., assignor of one-third to J. Froelich and one-third to L. B. Lamfrom, same place.

1,128,858. Apparatus for Generating or Producing Gas. W. R. Degenhardt, London, England.

1,129,000. Device for Watering Coke Ovens. H. S. Murray, Republic, Pa.

1,129,080. Gas Burner. O. K. Earle and F. J. Madden, Minneapolis, Minn., assignors to Economy Gas Valve Co., same place.

1,129,135. Chimney for Incandescent Burners. A. P. Storrs, Oswego, N. Y., assignor to Storrs Mica Co., same place.

1,129,258. Gas Producer. G. J. Weber, Kansas City, Mo.

1,129,475. Automatic Gas Cut Off. B. Friedman, Trenton, N. J., assignor, by direct mesne assignments, of one-sixth to W. S. Spivack, one-sixth to R. Kramaroff, one-sixth to N. Kramaroff, and one-half to A. Garbell, Philadelphia, Pa.

1,129,546. Gas Burner. A. K. Brettelle, Chicago, Ills., assignor of one-half to C. H. Stephens, same place.

1,129,558. Gas Purifying Apparatus. H. Dicke, Berlin-Wilmersdorf, Germany, assignor to Berlin-Anhaltische Maschinenbau-Aktien-Gesellschaft, Berlin, Germany.

1,129,566. Water Heating Appliance for Gas Stoves. C. H. Giese, Newark, N. J.

1,130,001. Manufacture of Various Products from Bituminous Fuel. R. Maclaurin, Stirling, Scotland.

1,130,132. Burner. F. Antonuccio, Oakland, Cal.

1,130,195. Gas Lighter. J. Y. Parke, Philadelphia, Pa.

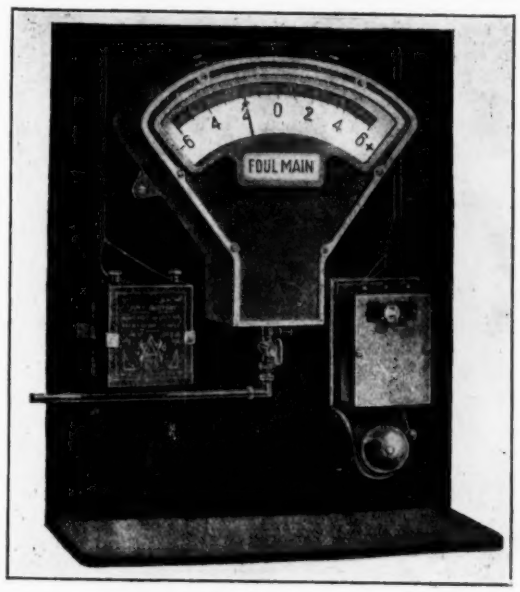
1,130,212-13-14. Art of Removing Tarry Substances from Gas. F. W. Steere, Detroit, Mich., assignor to Semet-Solvay Co., Solvay, N. Y.

1,130,215. Discharging-Electrode and Method of Forming the Same. F. W. Steere, Detroit, Mich., assignor to Semet-Solvay Co., Solvay, N. Y.

1,130,512. Method of and Apparatus for the Manufacture of Producer Gas. L. E. Hirt, Pittsburgh, Pa.

New Methods and Appliances.

AN ALARM OR TELL-TALE FOR THE EXHAUSTER.—Mr. J. G. M'Geachin, engineer and manager of the Dumbarton, Scotland, gas works, has designed an apparatus for ensuring that the running of the exhauster shall effect exactly the amount of pull required on the hydraulic main, or rather, an apparatus that will betray at once the fact that the exhauster is not so running. It has been in use at Dumbarton gas works for some time now, and nothing



but entire satisfaction has been experienced. The apparatus consists of a Simmance dead-beat indicator and an ingenious arrangement of alarmbell. It can be adjusted to give the required margin of both vacuum and pressure, and should either be exceeded, the alarm is given instantly, by the dropping of an annunciator to the horizontal position, as shown on illustration, and the alarm continues ringing until the annunciator is returned to the vertical position even although the pointer of the gauge may have returned to normal.

STEEL PIPE FIGURES.—Figures compiled by the American Iron and Steel Institute show that in 1913 about seven times as much steel pipe as wrought iron pipe was made. In 1905 the amount of steel pipe was only a little more than double the amount of iron pipe. The amount of iron pipe produced year by year, however, remains about stationary or slowly declines, while steel pipe production has rapidly increased. The use of steel in making welded pipe was not successful commercially until about the close of the '80's, but has had a very rapid growth in the quarter century since it began, the output last year having been 2,189,000 tons.

A NEW ALLOY.—The Franklin Institute has awarded the John Scott Legacy Medal and Premium to Charles Edward Guillaume, of Serves, France, for his alloy Invar. This alloy contains approximately 63.8% iron and 36.2% nickel; it is characterized by possessing an extremely small coefficient of linear expansion, about 0.0000004 per degree centigrade. Within the limits of atmospheric temperature change, its expansion is very exactly proportional to the temperature. It has a modulus of elasticity of about two-thirds that of steel, and its hardness is greater than that of hard brass. Invar has found a wide application in metrology and horology. In the former, it is particularly useful for secondary standards of length, and in the latter it is employed for pendulum rods, compensating devices for torsion pendulums and balance wheels correcting the secondary error of temperature in chronometers. Dr. Guillaume has done a large amount of research work in connection with iron-nickel alloys, in the course of which he also discovered platinite.

BURSTING FLYWHEELS MAY CAUSE BOILER EXPLOSIONS.—In the January bulletin of the Fidelity & Casualty Company of New York it is pointed out that if the planes of fast-revolving flywheels are in line with boilers, bursting of the wheels is liable to cause boiler explosion. If this happens, the owner will not be compensated for his loss unless he carries flywheel insurance, as boiler insurance policies cover losses resulting only from the force of steam.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Lloyd Construction Company, Detroit, Mich., has been awarded a contract to build three 36-feet diameter by 13 feet round steel purifiers, with 16-inch connections, for the Detroit City Gas Company.

MR. W. D. RAY, Manager of the Northern Indiana Gas and Electric properties in the Calumet region, will resign on May 1st to become manager of the gas and electric properties of the General Gas and Electric Company at Easton, Pa. Mr. Ray has been quite prominent in business circles in Hammond, and his announced intention of leaving has caused many expressions of regret. His successor has not yet been selected.

THE corporation attorney of St. Paul, Minn., and the St. Paul Gas Light Company have agreed on the settlement of the gas rate question, and the new rate of 85 cents is to go into effect Jan. 1, 1916. In consideration of this the gas company is to withdraw its injunctional proceedings in the Federal Court, enjoining the City of St. Paul from putting in force the ordinance for 85 cents, and the city agrees to postpone putting the ordinance in force for one year. The agreement now merely awaits ratification by the Council, which was assured the gas company by the the corporation attorney.

ONE of the early visitors to the Panama-Pacific Exposition writes in appreciation of the Gas Exhibit in the Palace of Manufacturers, and the general interest it attracts. The Rest Room maintained for visiting gas men is a good feature, and a file of the JOURNAL is among the reading matter on the tables.

REPORTS to the effect that General George H. Harries has resighed as president of the Louisville Gas and Electric Company are not correct. During the consolidation of the gas and electric companies at Louisville General Harries took an active and prominent part in the negotiations and later supervised the reorganization and unification of the properties. These duties having been performed, he accepted the presidency of the Omaha Electric Light and Power Company several months ago, at the same time retaining the presidency of the Louisville Gas and Electric Company. He has since devoted the major part of his time to the affairs of the Omaha company, Donald McDonald, vice-president and general manager, being in immediate charge of the Louisville Gas and Electric Company. General Harries is a vice-president of Byllesby & Co., and will continue as president of the Louisville organization.

SENATOR HENRY M. DELL has introduced a resolution in the New York Legislature, asking the Public Service Commission to make an investigation to determine if a 70 cent gas rate in localities where the rate is now 80 cents would give a fair return to the corporations supplying gas. It was referred to the Public Service Commission. An 80 cent gas rate is set by statute for New York city.

AT the annual meeting of the Guild of Gas Managers of New England, on Saturday, March 13, the following officers were elected for the year: President, Samuel J. Fowler, of Charlestown, Mass.; Vice-President, Dana D. Barnum, of Worcester Mass.; Treasurer, W. F. Norton, of Nashua, N. H.; Secretary, Henry K. Morrison, of Lynn, Mass.

MR. R. C. COFFY. Treasurer of the Tacoma Gas Company assumes the management of the Everett Gas Company, Everett, Wash., March, 15, having been appointed to this position upon the resignation of D. C. Green, who goes to Salt Lake City. Mr. Coffy has been in the service of H. M. Byllesby & Company for 7 years, having served the Oklahoma Gas and Electric Company prior to his connection at Tacoma.

MR. S. P. VECKER, Manager of the Key West (Fla.) Gas Company, recently addressed the members of the Key West Fire Department on "Safety First" methods. Mr. Vecker not long ago delivered an address at the Hargrove Institute on the "Chemistry of Gas."

THE Chisholm, Minn., Village Council has an application from Messrs. Kennedy, Smith and Lynch for a franchise to operate a gas plant in the municipality. After examining the franchise applied for the Council turned it back to the applicants for alterations. The matter will be taken up again at a later meeting.

IT is reported that three propositions have been made to Richmond, Va., for a lease of the city gas works. The Southern Gas and Electric Company has presented its offers; Humphreys & Miller of New York have expressed a wish to bid; and Mr. David Newbold of Baltimore, Md., has notified the Mayor that he will submit a proposition.

THE Union Public Service Company of Detroit, which recently required the plants and franchises of the Hoopeston (Ill.) Gas and Electric Company, is contemplating many changes in the plant. Just as soon as arrangements can be made, the gas engines which have been in use will be taken out and in their place will be installed a new 300-horse power Corliss engine. Orders have already gone to the manufacturers for this engine, and following its installation another unit of still larger capacity will also be placed into position in the plant. The company is also making arrangements for extending the gas mains in the city, and will lay two or three miles of additional mains early in May.

AT the annual meeting of the stockholders of the Rome (N. Y.) Gas,, Electric Light and Power Company there were present stockholders and proxies representing 3,998 shares of stock. The following directors were elected: E. H. Comstock, T. H. Stryker, F. M. Shelley, James T. Lynn, A. F. Wilkinson, B. N. Gurney and J. D. McMahon.

THE Waterbury (Conn.) Gas Light Company has petitioned for an amendment to its charter to allow the issue of $1,000,000 additional stock to buy outright the Watertown and Naugatuck Gas Companies for which the plant now provides gas, and to provide for extensive enlargements and improvements.

EFFECTIVE April 1st, the Gas Light Company of Waverly, N. Y., announces a change in rates, now $1.50 for light and $1.25 for fuel, to $1.40 gross for all gas. A discount of 15 cents per thousand will be allowed on bills paid by the 20th of the month, and of 25 cents on bills covering 20,000 or more in any one month.

THE people of Eveleth, Minn., have voted to grant a franchise to Thos. Lynch and J. A. Kennedy, after a warm fight on a municipal proposition. Messrs. Kennedy and Lynch propose to start work on the plant as soon as possible, and will furnish gas to the people of Eveleth at a rate of $1.40 per 1,000, with 10% off for early payment.

THE first award of prizes given by the commercial department of the Brooklyn (N. Y.) Union Gas Co. to the women of Brooklyn who secured the greatest number of students who became graduates of the domestic science division, was made last week in the auditorium of the company, at 180 Remsen street. Thomas Marshall Ambler presided and made a short address. The present course was inaugurated on January 25th last and nearly 2,000 women have taken advantage of the instructions given. At the award of the prizes it was discovered that a number of churches had entered classes in the course and that the money won by them would be devoted to the use of the churches. The church that profited most was the Parkville Congregational Church at Eighteenth Ave. and East Fifth street. The two women winning the first prize are Mrs. William Stevenson of 805 Foster avenue and Mrs. N. Wylie of Gravesend and Washington avenues. Both will contribute their prizes to the church. The Euclid Avenue Baptist Church entered the competition for the present month's prizes, as has also the Society for Ethical Culture, Mrs. J. W. Tantum entering her class.

THE ultimatum sent by the village trustees to the Patchogue (N. Y.) Gas Company that steps would be taken to cancel their franchise unless a back bill to the village was settled by March 2, has resulted in its payment. The check received was for $318.34, for 2½% of the gross sale of gas for 1913. In consideration for the franchise the gas company agreed to give the village this percent the first of every year. Should, however, the percentage total more than the company's taxes, the amount of the taxes was to be cancelled. For two years the village failed to receive anything from the gas company, so the ultimatum was considered necessary.

AT the last meeting of the Fall River (Mass.) Gas Works Employees Association about 100 members listened to Dr. A. I. Connell on "First Aid Treatment." His remarks were highly entertaining

and instructive. At the conclusion of Dr. Connell's talk refreshments were served. The entertainment committee provided a musical program, the feature of which was a cornet duet by William James and Clifton Burgess, with Mr. Bottomly of the company as accompanist. Mr. Burgess favored the club with some funny jokes and included several local hits which brought down the house. The closing number was a minstrel sketch in which Messrs. James and Burgess were in rare form.

THE Consolidated Gas, Electric Light and Power Cnmpany of Baltimore has been given a new contract for supplying gas for the street and park lamps and for use in public building. It reduced the price of gas for the street and park lamps by 2½ cents to 65 cents per 1,000 cubic feet. There are 10,400 gas lamps on the streets and parks, and they consume about 120,000,000 cubic feet of gas in the course of a year. Gas for the public buildings is to cost the same as under the old contract, 75 cents per 1,000 cubic feet. The city uses about 14,000,000 cubic feet of gas in the public buildings.

JUSTICE A. L. MCCUTCHEON has returned a verdict against the Albion (Mich.) Gas Light Company, charged by the city with failure to comply with the city ordinance requiring that coke be stored under sheds. The company will appeal the case.

ANNOUNCEMENT is made that West End and Lakeview, suburbs of New Orleans, are to have gas by next fall. Gas mains are already laid into City Park avenue, and they will be continued from that point out through Lakeview to West End. The opening of the beautiful park at West End by the city will greatly add to the demand for gas, and although gas will not be ready for this summer, it will be provided by the following one. The putting in of this service will be a costly piece of work, but that portion of the city is building up rapidly, and the people are entitled to service and the company intends to give it, said President Curran. There are already more than 100 houses in Lakeview, and with the large sales of lots now being made the number is expected to be more than doubled by the end of the coming summer.

CAPITALISTS interested in one of the three gas plants in Mexico have appealed to Congressman J. M. C. Smith to protest to Secretary of State Bryan in an effort to save the plant from confiscation at the hands of Mexicans. The plant is located at Guadalajara, the two others being in Mexico City and Monterey. For many months the plant has had great difficulty in obtaining coal and other supplies required for making gas, and a portion of the time the supply of gas making material has been conserved by the employment of wood instead of coal. While the plant has never been directly threatened by any of the revolutionary or other factions who have kept the country in a turmoil, it has nevertheless felt the effects of the internal strife.

THE Lynn (Mass.) Gas & Electric Employees' Association had its annual banquet with songs and recitations, a good dinner and two hours of bowling. Introduced by President Robert Keenan of the association, the club's guests and members responded to toasts. Among those who spoke were General Manager Morrison of the Company's Lynn branch, Treasurer Eugene B. Fraser and Superintendent Drake. Harold Messenger played on the piano while Mr. Ellsworth sang. Mr. Gadnon played the piano and John Heffernan sang. Frank Connors gave a song and dance and added a recitation. All then adjourned to the Casino alleys where six teams bowled. The committee was Benjamin Curtis, P. F. Moody, Walter B. Kirk, Frank Mace, John Heffernan, Frank Connors and Harry Blair.

MR. H. K. MORRISON, President of the New England Association of Gas Engineers, appeared before the committee on mercantile affairs of the Massachusetts Legislature, in opposition to the recommendation that a new standard measurement of 2,688 cubic inches for a bushel of coke and charcoal, supersede the present "Winchester" measure of 2,150.42 cubic inches. The recommendation was opposed on the ground that it would necessitate the complete reorganization of the equipment of the gas companies.

THE election of officers of the Mutual Advancement Association of the Union Light, Heat and Power Company, Fargo, N. Dak., rerulted as follows: A. L. Kipples, president; T. H. Thompson, vice-president; P. J. Tierney, secretary, and C. J. Remley, treasurer. A feature of the meeting was a lecture by W. W. Battel of the Detroit Stove Works, describing the manufacture of gas ranges, illustrated by a moving picture film.

UTILITIES COMMISSION NEWS.

MAY DISCONTINUE AFTER NOTICE.—The Arizona Corporation Commission has granted the petition of the Globe Light and Power Company that a former order of the commission be amended so service may be discontinued where the consumer does not pay after three notices of indebtedness have been sent, the last notice being delivered in person.

The Commission has also approved the application of the Pacific Gas and Electric Company that certain changes be made in the rules regarding collection of delinquent accounts. The commission has ruled that all bills for gas and electric service unpaid by the 18th of the month succeeding that in which service is rendered, shall be delinquent. The company will mail a notice of such delinquency to such delinquent consumer at his last known address on or before the 20th day of each month. In the event that any delinquent consumer to whom notice has been mailed has not paid such delinquent account in full on or before the 26th day of such month, then the service will be disconnected.

SEATTLE LIGHTING COMPANY VALUATION.—In a decision just made public the State Public Service Cowmission announces that the valuation (for rate-making purposes) of the Seattle Lighting Company, which supplies Seattle with gas, is $9,126,993, as against the total of $11,695,074 claimed by the company.

The cemmission, in its findings, announces that the allegations relative to the company charging merchandise in with its gas bills and refusing to give service if default on the same was made, to be unfounded, and says if true the commission would have ordered it stopped. The 50-cent minimum by stipulation was cut to 25 cents per month. The commission fixes the depreciation of the plant at $548,170.

The feature of the valuation report is the elimination by the commission of the $800,000 for bond discount; $850,000 as the franchise value and $1,629,000 as the "going concern value" from the valuation of the plant for rate-making purposes.

The figures of the company and the commission were as follows:

	Company.	Commission.
Cost of reproduction	$7,434,875	$7,532,787
Working capital	290,000	158,649
Bond discount	800,000	.....
Franchise value	850,000	.....
Going concern value	1,629,000	.....
Development cost	1,641,199	1,594,096

The question of rates is disposed of as follows: "Counsel representing the city of Seattle stated before the commission in response to a question submitted by the chairman that there was no evidence which showed or tended to show that the rates charged by the defendant company were unjust, unreasonable or unfair, or that would justify the reduction of said rates in any particular."

OHIO COMMISSION CHANGES PROPOSED.—Representative Frank Reighard has offered a bill in the Ohio Legislature which will change the law requiring physical valuation of public utility companies for rate making purposes. This bill strikes out the mandatory clause and leaves it to the judgment of the commission as to whether or not a valuation shall be made. The commission must determine through a hearing whether it would be necessary to make a valuation, and then the order may or may not be issued.

Another bill introduced is of an enabling nature and is intended to give the city of Bellefontaine the right to sell the product of its municipal plant to public institutions and other consumers outside of its corporate limits. It provides that rates for such service must be sufficient to pay all operating expenses, maintenance, depreciation, repairs, losses, damages and interest at 5% per annum on the cost of acquiring, constructing or extending such work. As the bill is of a general nature, these requirements would be effective in all cities and towns where municipal plants are established. Mayor Newton D. Baker of Cleveland has pronounced the bill unscientific and unsound and predicted that it will not pass.

PUBLIC UTILITIES COMMISSION PROPOSED FOR UTAH.—A bill providing for the creation of a public utilies commission has been presented before the 1915 session of the Utah Legislature and is now before the judiciory committee. Several public meetings have been held and many have appeared before the committee. It is urged that Utah and Wyoming are the only two States which do not now have such a commission, and that the growth of public service corporations has reached a point where regulation is necessary.

Financial Notes.

UNDER the plans of the Reorganization Committee of the MIDWAY GAS COMPANY, a new corporation is to be organized to take over the properties of the company and acquire the natural gas properties of the Southern California Gas Company and the Northern Exploration Company. The new company proposes to authorize the following securities:

A—$2,950,000 first and refunding 6% bonds.
B—$88,305 five year 6% notes.
C—$1,173,600 7% cumulative non-assessable preferred stock.
D—2,326,400 common stock.

The purposes for which the first and refunding bonds will be issued are described as follows:

(a) $1,450,000 principal amount of new bonds shall be issued par for par in exchange for the $1,450,000 principal amount of 6% first mortgage bonds of the Midway Gas Company, issued under its mortgage, dated November 20, 1911.

(b) $637,000 principal amount of new bonds, all bearing numbers subsequent to the $1,450,000 of bonds referred to in clause (a), shall be issued for the purpose of acquiring or aiding in acquiring the following properties now owned by Southern California Gas Company:

(1) The compressor station located near Taft, and now operated in connection with the gas pipe line of the Midway Gas Company, the several gathering lines running from the gas wells now operated by the Southern California Gas Company or from which such company receives gas, and all real estate, leases, easements, rights of way, equipment and apparatus owned by the Southern California Gas Company appurtenant to or necessary to the maintenance or operation of said compressor plant and gathering lines, but not including any supplies on hand.

(2) All interest of the Southern California Gas Company in any gas wells, or wells producing gas and oil, located on the lands of the Southern Pacific Land Co., Kern Trading and Oil Co., Associated Oil Co., or Honolulu Consolidated Oil Co., and all rights held by the Southern Californian Gas Company to take natural gas or other substances from the lands of any of said companies or to purchase gas therefrom.

It is the intention to acquire all properties, contracts rights and franchises now held by the Southern California Gas Company and used or held by it for the purpose of producing, gathering and compressing natural gas in the Midway fields.

(c) Not exceeding $38,000 principal amount of new bonds, all bearing numbers subsequent to the bonds referred to in (a) and (b), may be issued to reimburse the company for capital expenditures incurred by Midway Gas Company in the reconstruction of its pipe line.

(d) $825,000 principal amount of new bonds shall be reserved to be issued from time to time for the purpose of enabling the company to acquire, or to reimburse the company for betterments, extensions, improvements and additional property.

JUDGE AUGUSTUS N. HAND in the Federal District Court has signed the decree for the foreclosure sale in the suit brought by the American Trust Company, as trustee, against the ATLANTIC GAS AND ELECTRIC COMPANY and Calvert Brewer, as trustee in bankruptcy of the company, and THE PENNSYLVANIA UTILITIES COMPANY. The Atlantic Gas and Electric Company is directed within ten days to pay the clerk of the court $1,731,867.34 for the benefit of the holders of the first lien 5% sinking fund bonds, Series A, dated December 1, 1912, and $802,529.18 for the benefit of the holders of Series B bonds. In the event of a default the bonds and stocks put up as security for the two series of bonds are to be sold at auction on the County Court House steps. Edward H. Childs has been appointed special master for the sale.

THE CONSOLIDATED GAS, ELECTRIC LIGHT AND POWER COMPANY, Baltimore, Md., has issued a call for a special meeting of stockholders March 22 "for the purpose of considering and acting upon a proposal to amend the charter of the company so as to increase the total common stock authorized to be issued and outstanding from $20,000,000 to $30.000,000. President Herbert A. Wagner made the following statement: "The object of the increase in the common stock is to take care of the normal growth of the company. Each year we require from a million to a million and a half dollars for this purpose. We have now gone as far as we can go with the sale of common stock and require more. It is not intended that there will be an immediate issue of additional common stock as soon as it is authorized. The action is merely to be forehanded and to provide for the future. We must also set aside as much of the common to take care of the exchange or convertion privilege of the other securities. There is no especial significance whatever in the action contemplated, and what I have said covers the matter in its entirety."

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